OUT TO LUNCH

Suggested Grade

6

SD Mathematics Strand & Standard *(Primary for Task)*

Number Sense

6.N.2.1. Add, subtract, multiply, and divide decimals.

Task Summary

Students apply their understanding of numbers to compute the per person cost of a restaurant dinner.

Time and Context of Task

This task would be done at the end of a unit on decimals and percents. It should take three class periods. Students would complete all the calculations on the first day. On the second day students would prepare the reports. On the last day students would share their reports with the class.

Materials Needed

Page with directions for task, menus from local restaurants, posterboard, blank overheads, markers, overhead pens

Author and Lead Teacher for This Task

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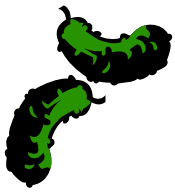
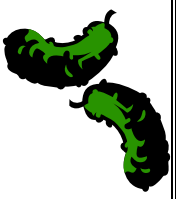
OUT TO LUNCH

Students are going out to lunch with three other friends. They can pick a local restaurant and use the menu to order food and beverages. Students need to find the cost of the food, tax, a reasonable tip, and the final cost per person. Students then prepare a report that includes "visual aid" – poster, overhead, handout – that shows all their calculations. Students will share their reports with the class and explain their "reasonable tip" and "rounded cost per person".


"Out to Lunch"
Calculations with Decimals and Percents

<u>Directions</u>: You may do this activity alone or with a partner. If you do it with a partner, you may complete the report together. However, each of you should individually do all calculations and then compare answers to be sure they are correct. (You may use a calculator to check your calculations at any step, <u>after</u> you have completed them with paper and pencil.)

You are going out to lunch with three other friends. Look through the menus and pick a place to eat. Complete the following tasks.

- ☐ List the food and beverages that each person will order. (4 people total)
- ☐ Find the total cost.
- ☐ Figure out a 6% tax and add it to the total cost.
- ☐ Figure a 15% tip on the new total cost. Round that number to a reasonable tip. (A reasonable tip might be to the nearest quarter or nearest dollar.)
- ☐ Add the tip to the total cost (food & tax) to get the final cost.
- ☐ Now divide the final cost by 4 to see what each person should pay.
- ☐ If everyone pays with cash, what is a reasonable rounded amount that each person might pay?




Prepare a report for your class. The report must have a "visual aid" – poster, overhead, handout – that shows all your calculations. Be ready to explain your "reasonable tip" and "rounded cost per person".


CONTENT STANDARDS

Primary Standard
Strand Name: Number Sense
SD Goal: Students will develop and use number sense to investigate the characteristics of numbers in a variety of forms and modes of operation.
Indicator: Apply operations within the set of real numbers.
Standard: 6.N.2.1. Add, subtract, multiply, and divide decimals.

Supplemental Standard
Strand Name: Number Sense
SD Goal: Students will develop and use number sense to investigate the characteristics of numbers in a variety of forms and modes of operation.
Indicator: Develop conjectures, predictions, or estimations to solve problems and verify or justify the results.
Standard: 6.N.3.1. Students are able to use various strategies to solve one- and two-step problems involving positive decimals.

NCTM Process Standards
Communication: Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
Problem Solving: Solve problems that arise in mathematics and in other contexts.
Connections: Recognize and apply mathematics in contexts outside of mathematics.

Problem-Solving Strategies
- Estimation and check
- Developing formulas and writing equations
- Elimination of extraneous data
- Acting out the problem

ASSESSMENT TOOLS

Task Rubric

	Advanced	Proficient	Basic	Below Basic
Content Standard: 6.N.2.1. Students are able to add, subtract, multiply, and divide decimals.	Accurately computes answers and uses rounding and/or estimation appropriately.	Computes answers and uses rounding and/or estimation with only a few minor errors.	Several computational errors and/or rounding or estimation errors.	Incorrectly calculates the percent of a number. Incorrect rounding and/or estimation.
Content Standard: 6.N.3.1. Students are able to use various strategies to solve one- and two-step problems involving positive decimals.	Uses an efficient and effective strategy to solve the problems. All steps of the problem are shown and labeled.	Uses an effective strategy to solve the problems. Most steps of the problem are shown and labeled.	Sometimes uses an effective strategy to solve the problems, but does not do it consistently. Several steps are missing and/or not labeled.	Problem is not completely solved. Most of work is not shown and/or not labeled.
NCTM Process Standard: Communication: Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	There is a clear, effective explanation detailing how the problem is solved. Student is able to answer questions asked by classmates.	There is a clear explanation of how the problem is solved. Student is able to answer most questions asked by classmates.	There is an incomplete explanation of how the problem is solved and/or it is not clearly presented. Student has difficulty answering classmate's questions.	There is no explanation of the solution, the explanation cannot be understood, or is unrelated to the problem. Student does not answer classmate's questions.

Sixth Grade Number Sense
Performance Descriptors

Advanced	**Sixth grade students performing at the advanced level:** • justify problem-solving strategies used in two-step situations with decimals; • apply problem-solving strategies using factors and multiples with the set of whole numbers.
Proficient	**Sixth grade students performing at the proficient level:** • read, represent, estimate, and calculate decimals; • apply problem-solving strategies in one- and two-step situations with decimals; • represent numbers in a variety of forms; • find factors and multiples using the set of whole numbers.
Basic	**Sixth grade students performing at the basic level:** • read, represent, estimate, and calculate whole numbers; • apply problem-solving strategies in one-step situations using the set of whole numbers; • find multiples using the set of whole numbers.

Sixth Grade Number Sense
ELL Performance Descriptors

Proficient	**Sixth grade ELL students performing at the proficient level:** • read, represent, estimate, and calculate whole numbers and positive fractions; • apply problem-solving strategies in contextual situations; • read, write, and speak the basic language of mathematics.
Intermediate	**Sixth grade ELL students performing at the intermediate level:** • read, represent, estimate, and calculate whole numbers; • apply number operations to solve problems in contextual situations; • explain in mathematical terms the sequence of steps used in solving problems; • give simple oral or written responses to directed questions on topics presented in class.
Basic	**Sixth grade ELL students performing at the basic level:** • apply number operations to solve problems involving whole numbers; • recognize and use basic mathematical terms; • respond to yes or no questions and to problems presented pictorially or numerically in class.
Emergent	**Sixth grade ELL students performing at the emergent level:** • solve numerical (not word) problems using addition, subtraction, multiplication, and division; • copy and write numerical symbols; • imitate pronunciation of numbers and mathematical terms; • use non-verbal communication to express mathematical ideas.
Pre-emergent	**Sixth grade ELL students performing at the pre-emergent level:** • observe and model appropriate cultural and learning behaviors from peers and adults; • listen to and observe comprehensible instruction and communicate understanding non-verbally.

OUT TO LUNCH

Student Work Samples

As you examine the samples, consider the following questions:

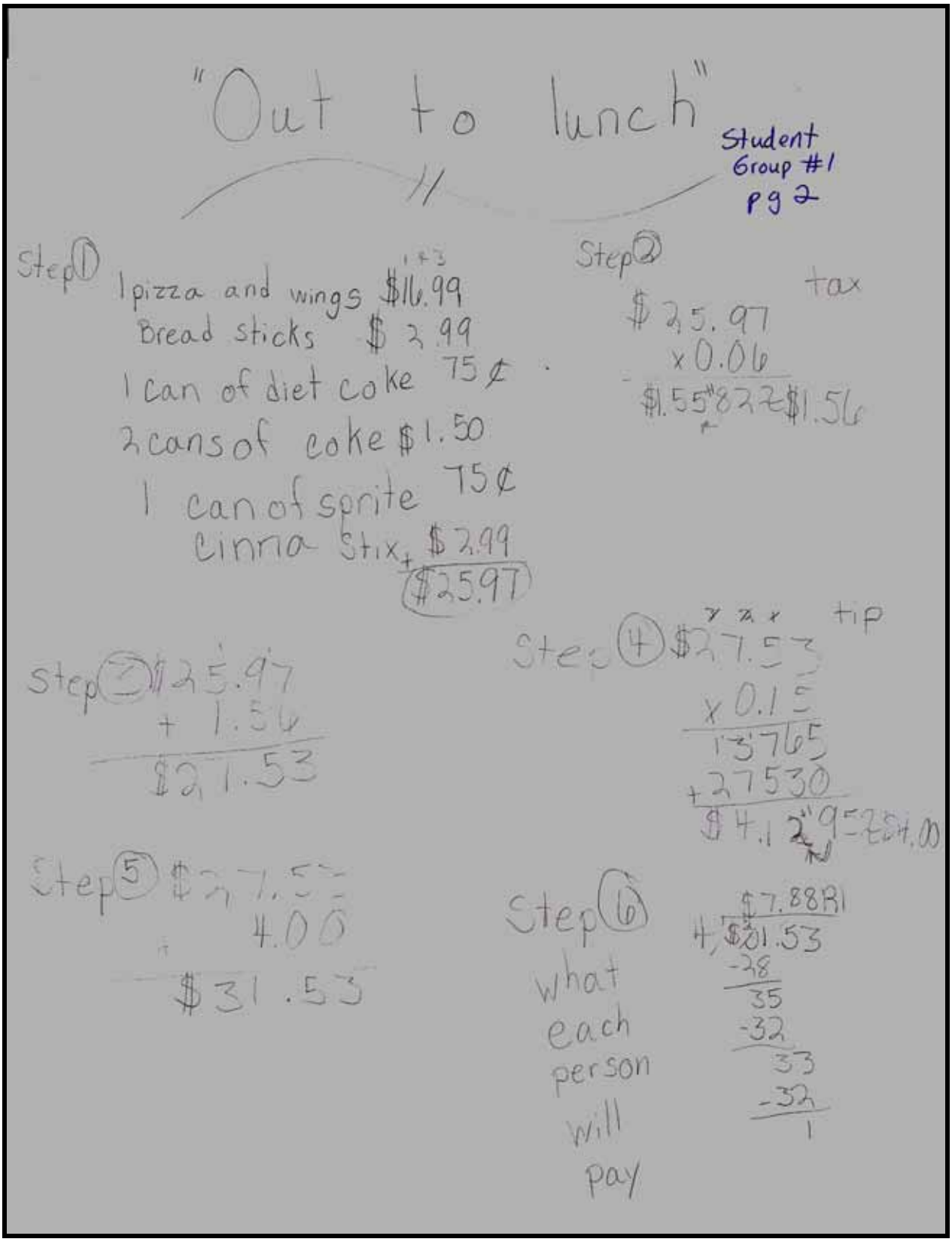
- In light of the standard/s addressed and the assessment tools provided, what evidence does the work provide that students are achieving proficiency in the knowledge and skills addressed by the standard/s for the task?
- Is the task/activity well designed to help students acquire knowledge and demonstrate proficiency? Is the task/activity clearly aligned with the standards? In what ways would you adapt the task/activity to better meet the needs of your students?

Student Work Sample #1

In "Out to lunch" we went to Dominos. We ordered 1 pizza that came with wings. It cost $16.99. We also ordered bread sticks that cost $2.99. Next we ordered 1 can of diet coke that cost 75¢, 2 cans of coke that cost $1.50, and 1 can of sprite that cost 75¢. Last we ordered cinna stix for dessert it cost $2.99.

We added up the food cost and multiplyed it by 6% tax. It came to $1.56 rounded. Next we added our food cost to $1.56 and came up with $27.53. After that we multiplyed $27.53 by 15% tip and came up with $4.00 rounded. Last we added the tip to the total to get $31.53, this how much it will cost all together.

The very last thing we did was divide $31.53 by 4 you get $7.88 with one penny left. So each person will pay $7.88 except one person who will pay an extra penny.



"Out to lunch"

Student Group #1 pg 2

Step ① 1 pizza and wings $16.99
Bread sticks $2.99
1 can of diet coke 75¢
2 cans of coke $1.50
1 can of sprite 75¢
Cinna Stix $2.99
$25.97

Step ② $25.97 tax
x 0.06
$1.55822 = $1.56

Step ③ $25.97
+ 1.56
$21.53

Step ④ $27.53 tip
x 0.15
13765
+27530
$4.1295 = $4.00

Step ⑤ $27.53
4.00
$31.53

Step ⑥ what each person will pay

$7.88R1
4 $31.53
-28
35
-32
33
-32
1

Looking at Student Work – Instructor notes and rating for work sample #1:

(The score for the NCTM Process Standard, Communication, was based on students' oral reports, so is not included in this evaluation. The student work samples are the "visual aid" that students used during their presentations.)

Student Group 1 – This group created an overhead for their visual aid and wrote out what they would say during their presentation. All their calculations are correct, as is their rounding. They estimated the tip correctly, but did not do a reasonable estimate for the cost per person. Also, when they calculated the cost of the food, they were not consistent in the format they used – some used the dollar sign and others used the cent sign. They labeled the step numbers, but not always what the numbers represented. They received a score of "Proficient" on Content Standard 6.N.2.1 and a score of "Proficient" on Content Standard 6.N.3.1.

Student Work Sample #2

Out To Lunch

By [redacted]

Went to Subway

All Bought-

Pizza Sub- $2.69
Pizza Sub- $2.69
Ham Sub- $2.69
Ham Sub- $2.69
Three Cookies- $1.00
Chips- $0.79
1 medium pop- $1.09
1 medium pop- $1.09
1 small pop- $0.89
1 small pop- $0.89
All together = $15.31

Tax-

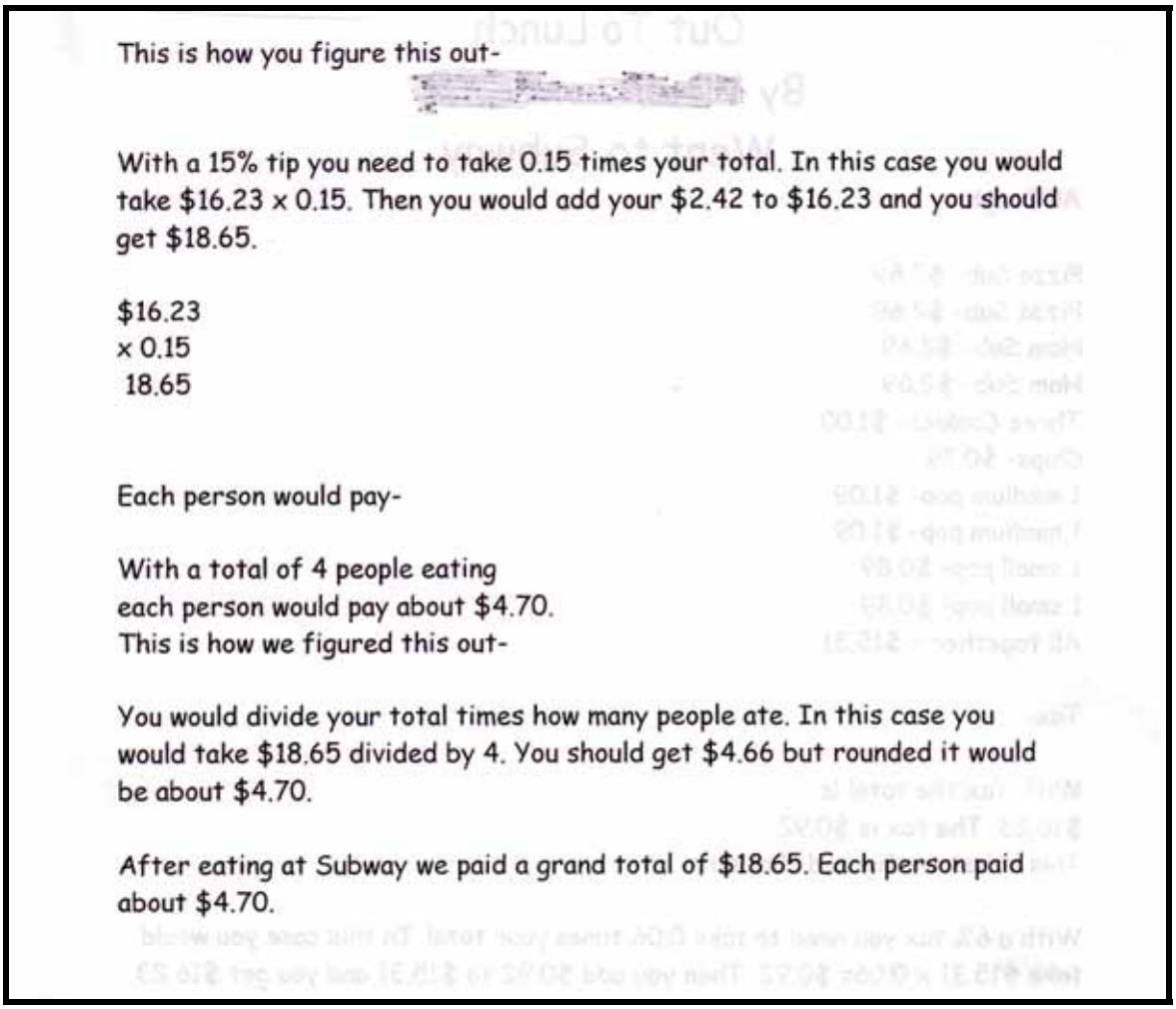
With Tax the total is
$16.23. The tax is $0.92.
This is how we figured that out-

With a 6% tax you need to take 0.06 times your total. In this case you would take $15.31 x 0.06= $0.92. Then you add $0.92 to $15.31 and you get $16.23.

$15.31
x 0.06
0.9186 You need to round the number (0.9186) to 0.92.

Tip-

With A tip the total is $18.65.
The tip is $2.42.



This is how you figure this out-

With a 15% tip you need to take 0.15 times your total. In this case you would take $16.23 x 0.15. Then you would add your $2.42 to $16.23 and you should get $18.65.

$16.23
x 0.15
18.65

Each person would pay-

With a total of 4 people eating
each person would pay about $4.70.
This is how we figured this out-

You would divide your total times how many people ate. In this case you would take $18.65 divided by 4. You should get $4.66 but rounded it would be about $4.70.

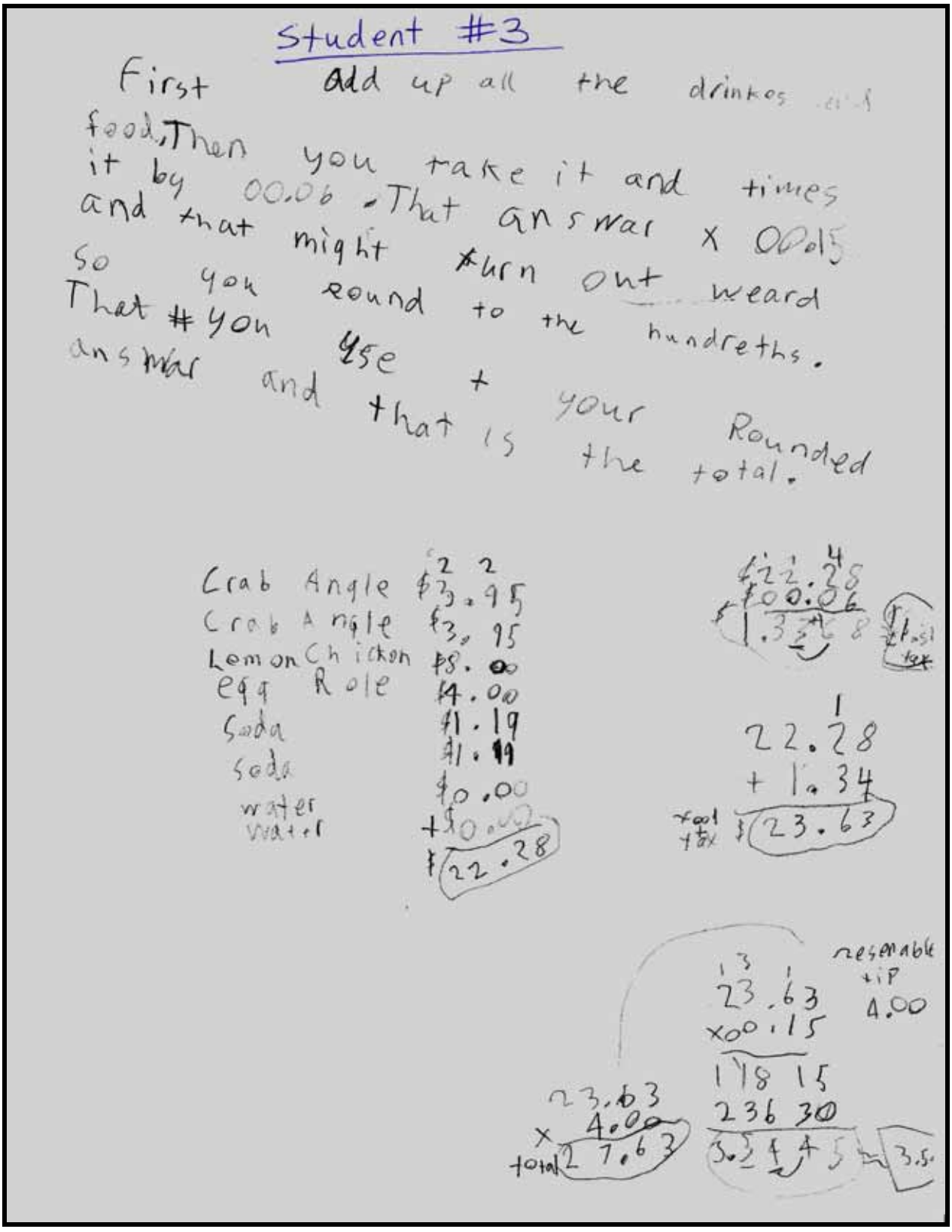
After eating at Subway we paid a grand total of $18.65. Each person paid about $4.70.

Looking at Student Work – Instructor notes and rating for work sample #2:

(The score for the NCTM Process Standard, Communication, was based on students' oral reports, so is not included in this evaluation. The student work samples are the "visual aid" that students used during their presentations.)

This group did their visual aid in narrative form, where they listed their answers and then told how they got them. They did not show the actual work they did on the calculations, so I'm not sure what caused their mistakes. The food total is incorrect, $15.31 when it should be $16.51. Using their food total, the tax is correct, but the tip is one penny too small. They did not estimate a reasonable tip, but they did correctly estimate the final cost per person. They received a score of "Basic" on Content Standard 6.N.2.1 and a score of "Proficient" on Content Standard 6.N.3.1.

Student Work Sample #3

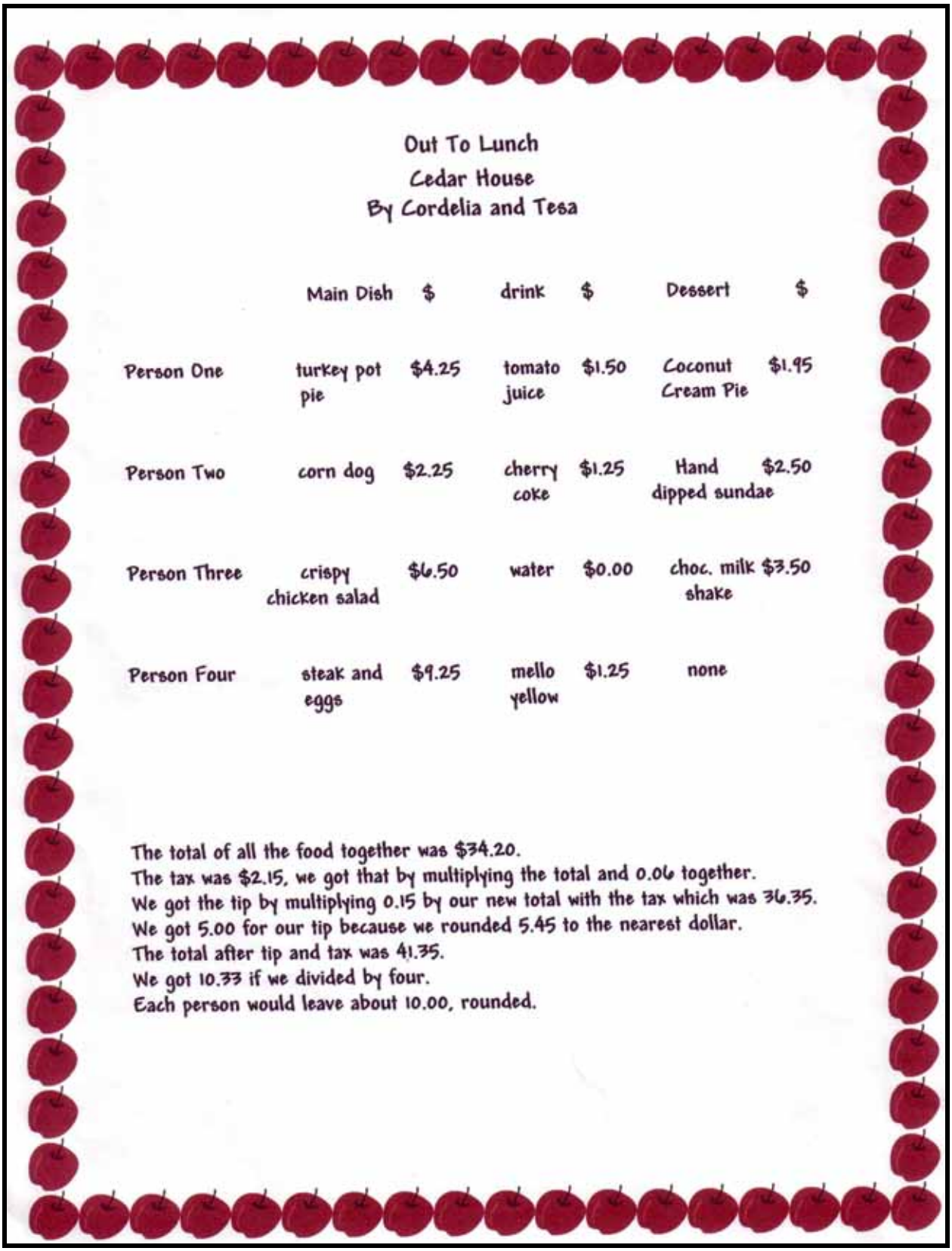


Looking at Student Work – Instructor notes and rating for work sample #3:

(The score for the NCTM Process Standard, Communication, was based on students' oral reports, so is not included in this evaluation. The student work samples are the "visual aid" that students used during their presentations.)

This student chose to work alone and did not complete the activity. He calculated the food cost and tip correctly, but made an error when adding them together. He did calculate the tip and give a reasonable estimate. However, he skipped the final step of figuring a reasonable cost per person. He did show his work and label most answers. He also wrote a partial explanation of the processes he used. This student is difficult to score because I would have given him a "Proficient" on both Content Standards based on the work he did complete, but since the final step is missing, I gave him a score of "Basic".

Student Work Sample #4



Out To Lunch
Cedar House
By Cordelia and Tesa

	Main Dish	$	drink	$	Dessert	$
Person One	turkey pot pie	$4.25	tomato juice	$1.50	Coconut Cream Pie	$1.95
Person Two	corn dog	$2.25	cherry coke	$1.25	Hand dipped sundae	$2.50
Person Three	crispy chicken salad	$6.50	water	$0.00	choc. milk shake	$3.50
Person Four	steak and eggs	$9.25	mello yellow	$1.25	none	

The total of all the food together was $34.20.
The tax was $2.15, we got that by multiplying the total and 0.06 together.
We got the tip by multiplying 0.15 by our new total with the tax which was 36.35.
We got 5.00 for our tip because we rounded 5.45 to the nearest dollar.
The total after tip and tax was 41.35.
We got 10.33 if we divided by four.
Each person would leave about 10.00, rounded.

Looking at Student Work – Instructor notes and rating for work sample #4:

(The score for the NCTM Process Standard, Communication, was based on students' oral reports, so is not included in this evaluation. The student work samples are the "visual aid" that students used during their presentations.)

This group made an overhead for their visual aid. They listed all their calculation answers and told what they did to get them. The tax is incorrect, but since they showed no work, I don't know what they did wrong. Their tax and cost per person estimates were not reasonable because they rounded both of them to the nearest dollar. Since both numbers rounded down, they ended up paying a total of $40.00, which is not close to the calculated total of $41.35. This group was also difficult to score because while they wrote what they did in narrative form, they showed no work. They received a score of "Proficient" on Content Standard 6.N.2.1 and a score of "Basic" on Content Standard 6.N.3.1.

INSTRUCTIONAL NOTES

My students had just completed a unit on calculations with decimals and finding the percent of a number. I chose this activity because it demonstrates one of the most common uses of percents and decimals. Since the activity was so complicated for sixth graders, I did list the steps for solving the problem. I did include rounding and reasonable estimates as these are critical real-life skills. I had copies of menus from some area restaurants, but I had some kids who talked their parents into taking them out to lunch so they could actually experience the activity.

Older students should be able to do this activity without the detailed list of directions. For some of my IEP students, I allowed them to use calculators, but they had to record each calculation.

Students who successfully completed this activity followed the steps and labeled all answers. They often checked with me partway through the activity to be sure they were rounding and estimating correctly.

Resources

SD Mathematics Content Standards
http://www.doe.sd.gov/contentstandards/math/index.asp

SD Assessment and Testing
http://www.doe.sd.gov/octa/assessment/index.asp

The National Assessment of Educational Progress (NAEP)
http://www.doe.sd.gov/octa/assessment/naep/index.asp

National Council of Teachers of Mathematics
http://nctm.org/

Looking at Student Work
http://www.lasw.org/index.html